

the observations of the Königsberg astronomer, the areographical western longitude and the latitude of the centre of the disc, the apparent diameter, the amount and position of the greatest defect of illumination, and the areocentric angle between the earth and sun, all quantities for Greenwich alternate noon. Vol. xxxii. of the "Memoirs of the Royal Astronomical Society," contains the sketches of Lassell, Lockyer, and Rosse, and this volume alone would be of considerable assistance to the intending observer, as will appear from Mr. Marth's second table.

CHEMICAL NOTES

CRYSTALLISATION UNDER GALVANIC CURRENTS.—A recent number of the *Journal* of the Russian Chemical and Physical Society (vol. ix., fasc. 2) contains an interesting report, by M. Shidlovsky, on observations he has made as to the microscopical crystallisation of various metals under the influence of a galvanic current. Placing on the object-glass of the microscope two fine metallic plates, the edges of which are about a quarter millim. distant, immersing them in a drop of water and passing a current through, M. Shidlovsky watched the growth of small ramified threads of crystals of metal transported from the cathode to the anode plate. The growth of these tree-like agglomerations goes on very speedily; their branches spread out to the anode plate, vibrate on reaching it, and collapse, whilst another ramified tree grows from the cathode spreading out to the anode; this goes on until the space between the plates is filled with a spongy metallic mass. Each of the metals experimented on (lead, silver, zinc, tin, copper, and iron) gives its own characteristic ramifications, and if the two plates be of different metals the tree has ramifications characteristic of the metal of which the anode plate is made. Gold and platinum do not exhibit any appearance of crystalline trees, nor does the crystallisation appear when the anode is gold or platinum. Iron submitted to a continuous current does not show a transport of crystals, but the phenomenon appears immediately when the currents are originated by a Ruhmkorff's coil or by a Holtz's machine. Iron-powder suspended in water undergoes a rapid motion under the influence of a strong inductive current, forming threads which spread out from the cathode to the anode plate.

ISODIBUTYLENE.—The same volume contains the second part of the important paper by Prof. A. Butlerof on the polymerisation of hydrocarbons from the ethylene series:—On isodibutylene.

ON THE THERMIC FORMATION OF OZONE.—M. Berthelot has recently investigated this question by subjecting pure and dry oxygen to the influence of the silent discharge, whilst passing the gas into a flask containing 500 c.c. solution of titrated arsenious acid. At the end of thirty minutes, six to nine litres of oxygen had passed through the flask, the temperature being raised one-third of a degree; then by passing the oxygen current without the action of the discharge for an equal time, the thermal data were rendered complete. The arsenious acid solution was then treated with potassium permanganate, and redetermined with a solution of oxalic acid. By this means the quantity of arsenious acid oxidised, and consequently ozone absorbed, was determined. The amount of oxygen absorbed was found to be 30.3 and 51.9 milligrams, corresponding to 90.9 and 155.7 m.m. ozone, the heat set free being 118.2 and 223 calories respectively. Hence for one molecule the heat is equal to + 68.8 calories. Subtracting from this the heat formed in the oxidation of a molecule of arsenious acid + 39.2 calories (Favre and Thomsen), we have + 29.6 calories for the heat set free in the condensation of one molecule ozone into oxygen, and consequently - 29.6 in the reverse process. Ozone therefore is a body in which heat is absorbed in its formation, its activity in

combination being probably due to this heat being set free. This is worthy of note when it is remembered that it is condensed oxygen, condensation generally setting free heat.

CHLOROPHYLL IN CONIFERÆ.—Coniferæ are remarkable amongst other plants for developing their chlorophyll even in places which seem perfectly dark. In the Reports of the *Naturforschende Gesellschaft* of Leipzig, Herr R. Sachsse publishes the results of some investigations he made in order to ascertain whether the chlorophyll formed under these circumstances is quite identical with ordinary chlorophyll. He extracted the chlorophyll from young Coniferæ, which had germinated in the dark, by boiling them in alcohol. He obtained a solution which showed the ordinary chlorophyll spectrum; all bands were in the right position and showed the correct grades of intensity. When the solution was concentrated the absorption at the end of the spectrum was continuous, when more diluted the absorption was resolved into the well-known three bands. The only peculiarity in this spectrum, when compared with that of chlorophyll of ordinary origin, was the somewhat lesser intensity of band V. According to Kraus's idea this would prove a predominance of cyanophyll over xanthophyll. The solution of Coniferæ chlorophyll very readily turns to modified chlorophyll.

CHEMISTRY OF THE GRAPE.—In several treatises lately presented to the Royal Academy of Physical and Mathematical Sciences of Naples, Prof. G. Licopoli gives an account of some recent micro-chemical researches upon oranges, lemons, and grapes. The latter are of special interest, as Prof. Licopoli tried to determine the time and place at which, in the grape, the different chemical substances which are contained in it (such as tartaric acid, chlorophyll, albuminoid matter, sugar, colouring matter, &c.) first begin to form. The conclusions which the author draws from his labours are the following: Tartaric acid and chlorophyll first show themselves in the tissue of the pistils in course of formation. Oxalate of lime next shows its presence in the sub-epidermic tissue in the form of raphides, in the endocarpic epidermis in the shape of conglomerated crystals (dumb-bells?), and in the kernels in raphides. The albuminoid matter first appears spread over the whole of the fruit, but predominates in the mesocarp. Colouring matter results from the metamorphosis of chlorophyll, its appearance and diffusion showing the growth of the fruit, and the progress the chlorophyll has made at the time of its formation. The growth of this colouring matter begins in the peripheral tissues, and continues towards the central ones. Sugar is found in the pericarp wherever there is tartaric acid present. Resinous matter or wax appears first on the surface of the epicarpic epidermis. Tannic acid is principally formed in the seed, and particularly in the hard and friable part of the episperma; the fibro-vascular fascicles of the pericarp, however, also contain this acid.

NOTES

We regret to hear that the state of health of M. Leverrier, the distinguished director of the Paris Observatory, is causing great anxiety to his friends. He has been entirely prostrated by his enormous labours, which have been almost unceasing for the last twenty years.

M. BELGRAND read, at the last sitting of the Council of the Paris Observatory, a report on the necessity of extending telegraph warnings to Algeria, and taking advantage of the documents collected by the Algerine Meteorological Service. The necessary steps will be taken by M. Leverrier, and observations extending from Morocco to Tunis, and from the Mediterranean coasts to Laghouat and Biskra will be sent to and from Paris to every Meteorological Office in connection with the meteorological system. At the same sitting M. Leverrier an-

nounced that he had taken steps to utilise the weather telegrams sent from America by the *New York Herald*.

THERE is no ground whatever, we are informed, for the rumour that M. Krantz will resign his office of Director of the International Exhibition, or that the Exhibition will be postponed. The works are progressing favourably, and will not be interrupted. The British Commission have secured a large plot of ground close to the Champ de Mars for their private use. This ground measures more than 5,000 square yards.

THE Emperor of Brazil, who is now in Paris, has been assiduously attending the meetings of various scientific societies. On Friday he was present at the meeting of the Zoological Society. Several communications were read on fishes, insects, and worms from Brazil. He was also present at the last sitting of the Geographical Society of Paris. A paper was read on the Pampas by an American gentleman, whose flattery of the Emperor was so high that his Majesty left the room to show his disapproval. The lecturer stated that the Argentine Republic was building a strong wall to protect the Pampas against incursions from uncontrollable Indians, and that in doing so not less than 20,000 square miles of excellent grazing ground will be reclaimed.

THE Congrès Scientifique of France is holding its present session at Versailles on the occasion of a floral meeting, as we intimated two months ago. The principal attraction is a series of excursions held in the vicinity of Versailles.

THE Russian Council of State has granted a yearly sum of 2,000 roubles to the West Siberian Branch of the Russian Geographical Society at Omsk.

RUSSIAN newspapers announce that Prof. Ahlquist had reached, on April 10, Kondinsk, 530 miles north of Tobolsk. His companion, M. Bergroth, remained at Tobolsk.

SCIENCE in Italy has suffered a heavy loss through the death of Prof. Dr. C. L. Rovida, formerly first physician at the Ospedale Maggiore of Milan, and for the last three years Professor of Special Pathology and Clinical Medicine at the University of Turin. Next to Prof. Moleschott in rank, if not in fame, he was one of the few Italians who follow a rigidly scientific method of investigation and instruction.

THE fourth number of the *Bulletin* of the Geographical Society of Egypt contains an interesting account of a journey to Harar with a plan of that place, published by two Arabian officials; one of whom, Fayous Effendi, accompanied the Italian expedition to Zeilah.

MOUNT VESUVIUS shows signs of fresh activity. The crater is continually sending forth clouds of smoke which at night assume a fiery aspect from the deep-lying glowing lava masses.

CAPT. R. GESSI, the Italian explorer of Albert Nyanza under Col. Gordon, is now preparing at Cairo to undertake, on his own account, a new expedition in company with a naturalist and a photographer. He intends to push forward to the Equatorial Lakes, studying, on his route, all the principal facts of meteorology, anthropology, and natural history, taking sketches and photographs of men, animals, plants, and interesting geological features.

A CORRESPONDENT writes to us that the medal "of the first class" of the Paris Acclimatisation Society was presented, not to Mr. Alfred Mosenthal, but to Messrs. Julius de Mosenthal and J. E. Harting, the joint authors of the work recently published by Messrs. Trübner and Co., on "Ostriches and Ostrich Farming," and reviewed by us in vol. xv. p. 176. This work was published some time after the experiments, to which we referred last week, were made at Algiers. These experiments will be found to be fully detailed in the work in question.

A LETTER received at Rome from the commander of the *Scilla* states that the Italian expedition for the exploration of Central Africa were occupied at Zeilah on April 27 with the final preparations for their then imminent departure to Shoa.

IN the last two numbers of the *Bolletino della Società Geografica Italiana* Prof. Gio. Beltrame publishes an interesting paper on the language of the Akkás—an African tribe of which two individuals were brought over to Italy some years ago. This first attempt at giving an idea of the Akká language and its grammar will prove a valuable contribution to the study of comparative African linguistics.

AN immense quantity of locusts have shown themselves in the Algerian provinces, and are travelling from the south towards the Mediterranean. The number of these insects was so prodigious that the trains from Blidah to Algiers were almost stopped in the beginning of May.

MR. JOHN F. DOLLEY writes to the *Times* under date Uitenhage, Cape of Good Hope, South Africa, March 19:—"In this part of South Africa we have just witnessed a magnificent sight, such as a person can hardly expect to see more than once in a lifetime, if even then. It was on the beautiful clear starlight evening of the 16th of March, at about eight o'clock, when suddenly every one was startled with a bright lightning, like a flash, and on looking for the cause discovered a large meteor coming out of the eastern horizon, and which travelled slowly across the firmament, in an oblique direction to the westward, when it burst, sending forth streams of fire, as if from a hundred rockets, and then was heard a low rumbling noise as of thunder in the distance. The meteor appeared to be nearly, if not quite, as large as the full moon, but not round, more of an oblong shape, and while travelling through the air it very much resembled a large serpentine ball. It gave forth a bright bluish light which lit up the whole sky, and you could distinguish everything around you for miles as plainly as in the daytime. . . . A party of Hottentots who were coming in from 'Hankey,' a station belonging to the London Missionary Society, state that the driver of the waggon was struck down in the road, and that they all felt a glow of heat as the fireball passed them. The illumination lasted for nearly a minute, and the light was such that it dazzled the eyes of all who saw it."

A TELEGRAM from New York on the 16th states that forest fires are making great ravages in North-eastern New York, Long Island, Massachusetts, New Hampshire, Maine, Pennsylvania, Canada, and New Brunswick. A large part of the White Mountains is in flames. The summer hotels are in danger, and railways are interrupted. A great number of mills and dwellings have been destroyed, and hundreds of persons have been rendered destitute.

STEAM at ordinary pressure sent into saline solutions on which it has no chemical action, gives a rise of temperature that seems at first sight paradoxical, the temperature produced being always higher than that of the steam. M. Müller, of the Berlin Chemical Society, has been studying the phenomenon. Chloride of sodium is one of the best salts to use. A solution of it sufficiently concentrated to have a boiling point of 127° may be raised to 125° simply by sending steam into it at 100°. Here, then, the steam produces a rise of 25° above its own temperature. The more concentrated the solution the higher is the rise. M. Müller points out, in explanation, that saline solutions at 100° absorb the steam at the same temperature, and the result is a rise analogous to that produced when a gas, like ammonia, is dissolved in water. These experiments throw new light on the controverted question, what is the temperature of the steam which escapes from a concentrated and boiling solution? Is it 100° or a temperature near that of boiling of the solution? The new results seem to be against the latter, and common, view.

INTELLIGENCE has been received from Quebec stating that ships which have recently arrived at that port have encountered unusually large fields of ice and remarkably high icebergs in the Atlantic. The *Una*, from Leith, passed through eighty-five miles of heavy ice.

At the meeting of the Royal Society of Edinburgh on Monday night, reports were read from four lighthouse keepers on the west coast of Scotland, detailing their experiences of earthquake shocks on March 11 and April 23. The keeper of the Fladda lighthouse says the tower by his dwelling-house shook very much; the Lismore keeper reported that everything in his lighthouse shook at an alarming rate and awoke all the inmates. Mr. Stevenson, C.E., said these observations were valuable because of their trustworthiness.

THE engineers of the French Northern Railway have been making experiments with the vacuum brake, which has been found to work satisfactorily owing to its simplicity of construction. MM. Sartiaux and Lartique have devised some ingenious arrangements for bringing it into action automatically if any mistake has been made respecting the crossings. Should distressed passengers want to call for help they can also put the continuous break into operation instead of ringing a bell as is customary.

THE Superintendent's Report on the Botanic Garden and Public Plantations for 1875-76 has recently been officially published in Jamaica. It deals almost entirely with plants of economic value, foremost of which is the coffee, the ordinary kind (*Coffea arabica*), apparently giving way to its formidable rival *Coffea liberica*, which was introduced to Jamaica in 1874, and is now thriving, especially in some districts. In one situation, at a height of about 1,000 feet above the sea, a plant that had only been planted out a little over a year has already fruited. This seems to indicate that in the course of a few years the new coffee may be widely cultivated in Jamaica from plants raised from seeds ripened in the island. Amongst other important plants treated of in the report which have received special attention, may be mentioned cocoa, sugar canes, pine apples, cinchonas, jalap, &c.; of this last we learn that nearly two acres are under cultivation, producing during the year under review a crop of 1,700, and it was estimated at the time the report was written that an additional 3,000 would be obtainable in the course of a few months, all of which would find its way to England.

DR. LAUDER LINDSAY of Perth has for years been forming a collection of lichens, which, although frequently broken up and distributed, still forms the nucleus of a good type collection. The collection consists of—1. Herbarium, the main object of which is to illustrate the Variations of the Commoner Species; and so to encourage (1) the establishment of Typical, Comprehensive, or Aggregate Species; (2) the abolition of Named Trivial Variations; and the (3) consequent Reduction of Names, and Simplification of Synonymy and Classification. 2. Museum of Illustrations of the Economic Properties and Applications of Lichens. 3. Library of Lichenological Works, Foreign and British. 4. Drawings (original) of Microscopical Structure, several thousands unpublished. 5. Correspondence with Lichenologists. 6. Unpublished Manuscripts—of (1) Outlines of Lichenology; (2) "Lichenographia Britannica;" and of other works or papers illustrative of Lichens in various aspects. The collection has been offered—with all the cabinets and fittings in which it is contained—as a donation to the Royal Botanic Gardens of Edinburgh, on the simple conditions—(1) That a small room is provided for its accommodation in connection either with the Herbarium, or Museum of Economic Botany; and (2) That it is kept in proper order either by the Curators of said Herbarium or Museum, or by any of the numerous students of the Edinburgh School of Botany. But it is understood that

no such donations can be accepted by the said school, by reason of the very inadequate accommodation provided by Government for the more essential requirements equally of students and teachers. As has been repeatedly pointed out—officially and otherwise—there is at present urgent need—(1) of a new commodious class or lecture room; (2) of a new commodious museum; (3) of botanical laboratories; and (4) of extra special rooms for such herbarian or other purposes as the reception and maintenance of such donations as that now referred to.

A NEW burner for obtaining high temperatures in laboratories has recently been described by M. Godefroy. It consists of four metallic cylinders one within another; the first and the third are pierced with lateral holes at their base. The intervals between the cylinders communicate, one set with two vertical pipes uniting in a horizontal pipe below, the other set with another similar system. A piece of metallic net at the lower part regulates the entrance of air.

AT Tabor, in Bohemia, 423 metres above the sea, in a house out from the town, M. Farsky made observations of the amount of carbonic acid in the air from October 10, 1874, to the end of August, 1875. The average obtained was 3.43 volumes in 10,000 volumes of air; a number smaller than that of Saussure and Boussingault (4.15), and higher than those got by Schulze in Rostock and Fittbogen in Dahme. The most numerous variations are in November, December, February, March, and April, the least in October. M. Farsky says that the more variable the weather, and the sharper the transition from one weather to another, the greater are the variations in proportion of carbonic acid in the air. The strong north-west and south-west winds reduce the amount of carbonic acid, while the cold north and north-east winds, which are always thought the heralds of clear weather, cause an increase in the carbonic acid. Further, the carbonic acid is increased descending mist, and continuous dust-rain. No other connection with atmospheric precipitates was perceptible. These results agree, in the main, with those formerly obtained by Angus Smith and Roscoe. Smith found that the air in the suburbs of Manchester contained on the average 3.69 volumes in 10,000 volumes of air. The amount appeared to diminish slightly during long-continued westerly winds; on the other hand it increased when easterly winds prevailed. From a large number of analyses of air collected from the hill-districts of Scotland, Smith obtained, as an average, 3.36 volumes in 10,000 volumes; the extremes recorded are 3.00 and 3.60. These comparatively low numbers are probably due to the proximity of the sea, the air over which has been shown by Thorpe, from a large number of analyses made over the Atlantic Ocean and Irish Sea, to contain about 3.00 volumes of carbonic acid in 10,000 volumes of air. This amount was constant, or nearly so, in different latitudes, and, contrary to the statements of Lewy, exhibited no perceptible diurnal or seasonal variations.

THE additions to the Zoological Society's Gardens during the past week include two tigers (*Felis tigris*) from Jahore, presented by Rear-Admiral Rowley Lambert, C.B.; two Javan Chevrotains (*Tragulus javanicus*) from Java, presented by Messrs. Hill and Isaac, Lieuts. R.N.; a Malayan Bear (*Ursus malayanus*) from Sumatra, presented by Dr. F. Wicksteed; a Phatagin Manis (*Manis tricuspis*) from West Africa, a Humboldt's Saki (*Pithecia humboldti*) from the Amazons, a Red and Yellow Macaw (*Ara chloroptera*) from South America, a Sooty Mangabey (*Cercopithecus fuliginosus*) from West Africa, deposited; a Concave Casque Hornbill (*Buceros bicornis*), three Yellow-billed Blue Magpies (*Urocissa flavirostris*) from India, a Pin-tailed Whydah Bird (*Vidua principalis*) from West Africa, received in exchange; two Impeyan Pheasants (*Lophophorus impeyanus*) from the Himalayas, a Mantchurian Crossoptilon (*Crossoptilon mantchuricum*) from North China, purchased.